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(12) UK Patent Application (19) GB (11) 2 307 113 (13) A

(43) Date of A Publication 14.05.1997

(21) Application No 9522901.9

(22) Date of Filing 08.11.1995

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(51) INT CL⁶

H01R 17/04 9/05 11/20 13/703

(52) UK CL (Edition O)

H2E ECAAX ECBB EPX E303

U1S S2215

(56) Documents Cited

GB 2282715 A

GB 2266627 A

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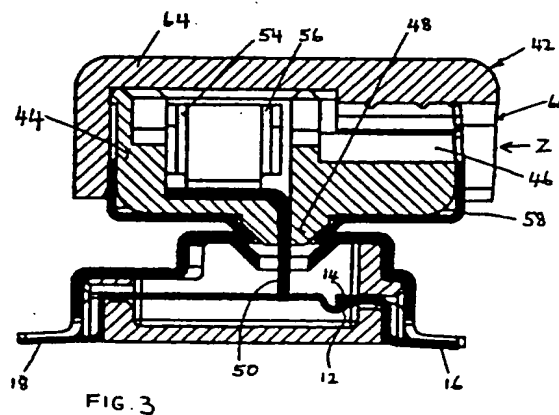
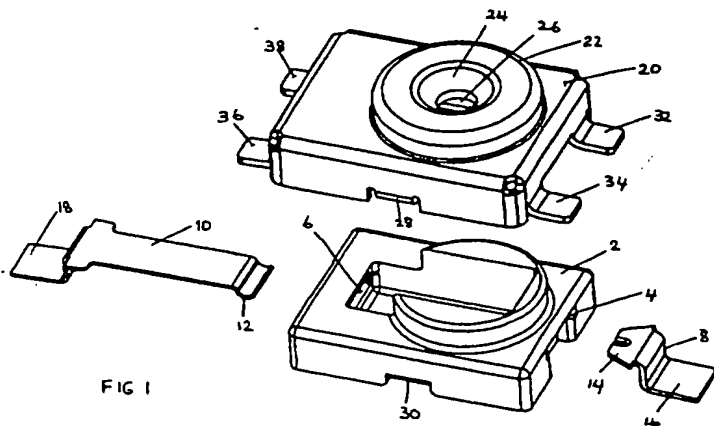
(58) Field of Search

UK CL (Edition O) H2E ECAAX ECBB

INT CL⁶ H01R

(54) Coaxial connector

(57) A coaxial connector has a housing 20 and a contact 10 which resiliently deflects in the mating direction upon mating of a counterpart. The deflection of the contact 10 may open a switch 12, 14 to couple a vehicle aerial to a mobile telephone on which the connector is mounted. When the switch is closed, the telephone's own aerial is connected. Flat radially-extending terminals 16, 18 of the connector engage a pcb of the telephone. The mating surfaces of the connector and counterpart may be a frusto-conical shape. The counterpart for the connector may be connected to a coaxial cable using idc contacts 54, 56, (60, 62, figure 5, not shown).



GB 2 307 113 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1995

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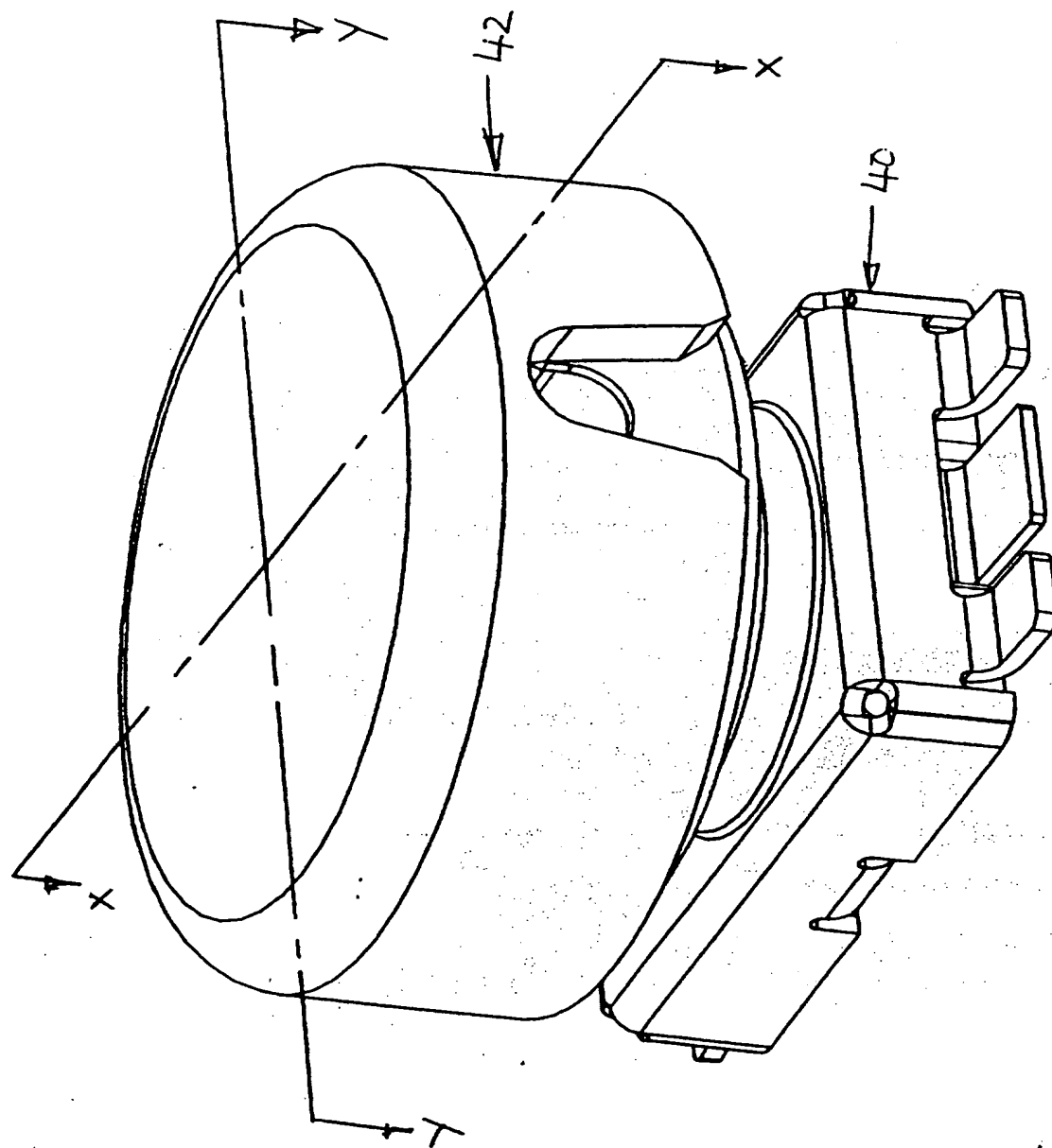


FIG 2

417

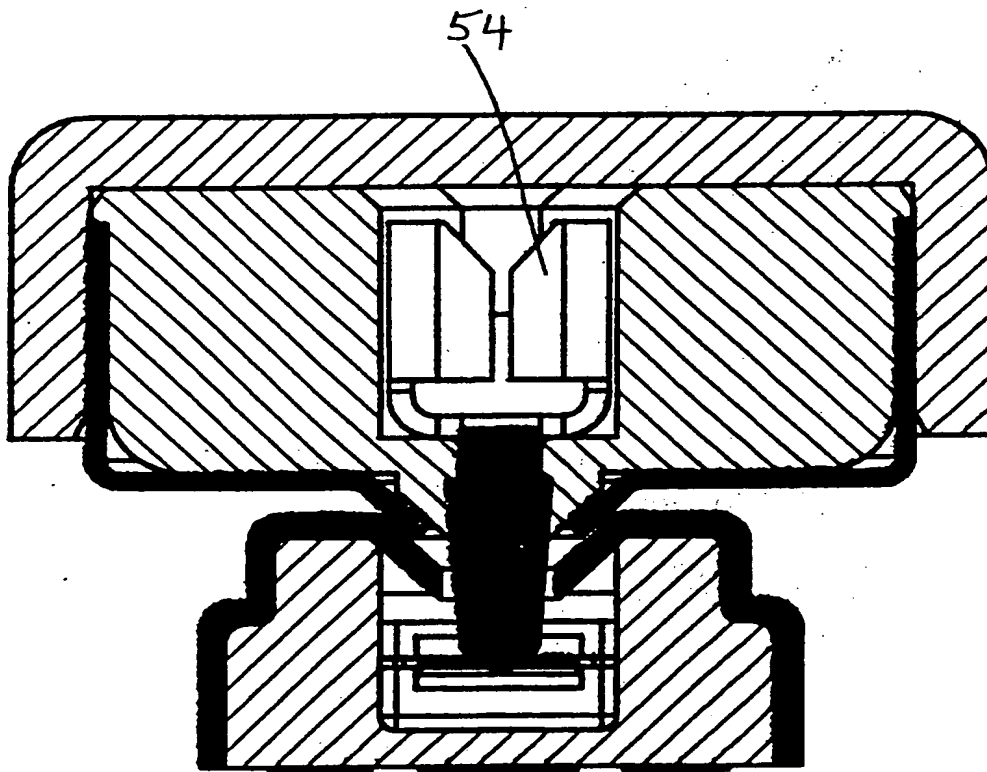


FIG. 4

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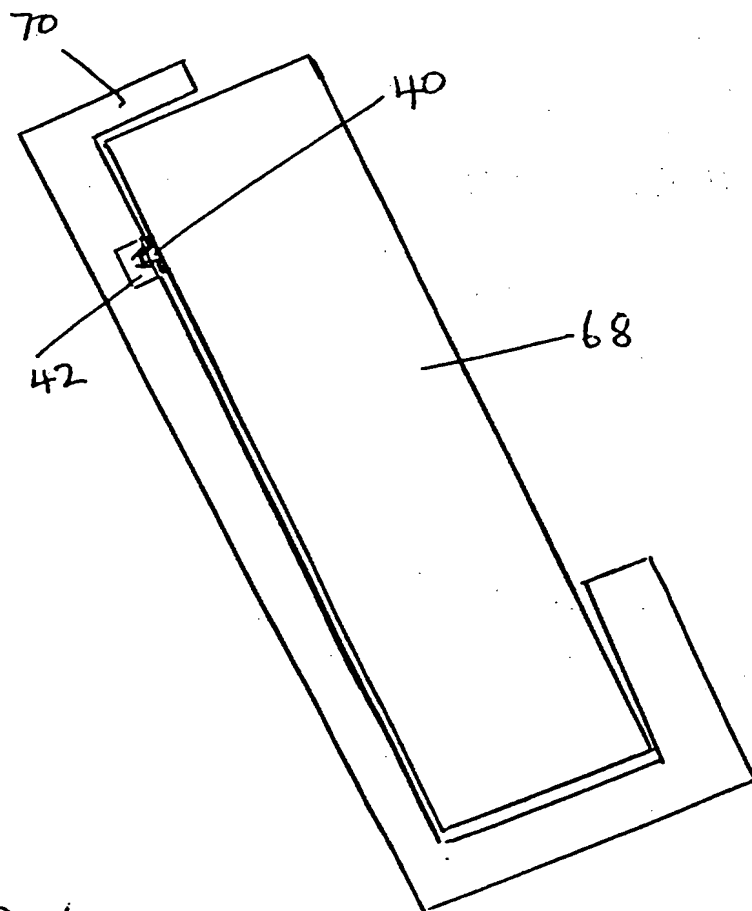


FIG. 6

IMPROVEMENTS IN OR RELATING TO COAXIAL CONNECTORS

This invention relates to coaxial connectors and more particularly but not solely to such connectors suitable for use with mobile telephones.

Coaxial connectors are well known for connecting coaxial cables to electrical equipment. Conventional devices employ male and female connectors the female of which is normally mounted on the equipment and the male of which is normally mounted on the end of the coaxial cables. Such connectors normally have on the female portion a contact for the central conductor which extends axially of the connector whilst the male connector has a projecting plug element again extending axially of the connector for connection to the central conductor of the cable. The two connectors are mated by a relative axial movement in line with the mating contacts. The disadvantage of such a construction is that the connectors have considerable length and if mounted in an equipment extended to a considerable depth within the equipment or alternatively project to a considerable extent outside of the equipment.

The present invention has been arrived at from as consideration of the requirements for such connectors in a mobile telephone where the telephone is to be adapted for use not only with its own internal aerial but with a substitute or external aerial such as might be provided on a vehicle. In such circumstances it is required to connect the substitute or external aerial to the mobile phone when located in the vehicle. It will be appreciated that mobile telephones are becoming smaller and more compact and this leads to a requirement for a coaxial connector of extremely compact form.

The present invention seeks to provide a connector

connector but which is separated from the other switch contact upon mating with a suitable connector. The other switch contact may be provided with a terminal which extends on one side of the housing and may extend in a radial direction relative to the mating direction so as to be substantially coplanar with the other terminals.

A coaxial combination in accordance with the invention comprises a first connector as previously defined and a second connector mateable with the first connector by relative movement in a mating direction, the second connector having a housing and a contact which makes contact with and effects a resilient deflection of the contact of the first connector during the mating movement. The contact of the first connector may be an elongate finger and the contact of the second connector may comprise a projecting element. The projecting element may have an end within the housing which extends laterally. The second connector may comprise a cable support body mountable in the housing having an elongate recess extending transversely of the mating direction, for receiving the prepared end of a coaxial cable, and a closure retentively locatable on the housing, which recess has projecting insulation displacement connectors extending into the recess and adapted to connect to screen and centre conductor of the prepared cable which are urged into engagement therewith when the closure is fitted on the housing.

The invention also includes a mobile telephone having a switched connector as previously defined, provided in the path between the integral aerial of the telephone and the transmitter/receiver circuitry which is effective to disconnect the integral aerial as a result of mating with a suitable connector coupled to a substitute aerial.

The invention also includes a mobile telephone equipment having a connector combination as previously

complementary connectors mounted each at a different printed circuit board permitting a coaxial coupling between boards.

Referring now to Figure 1 there is shown a coaxial connector having a body 2 moulded from a dielectric material and having slots 4 and 6 at opposite ends for receipt of metal switch contact and terminating elements 8 and 10. The element 10 is in the form of an elongate finger and is formed of a resilient material for example beryllium copper. The element 10 is formed at one end with a downwardly curved contact 12 which, after insertion of the element through the slot 6 makes contact with the end 14 of the element 8. The opposite ends of the elements 8 and 10 are formed downwardly and outwardly to provide terminals 16 and 18 for electrical connection to the tracks of a printed circuit board by for example soldering. The connector has a metallic housing 20 which has a raised dome 22 with an inwardly extending recess 24 of preferably truncated conical form the end of the recess provides an aperture 26. The housing 20 fits on the body 2 and locks thereon by means of cooperating latching elements 28 and 30 the housing has four downwardly and outwardly extending terminals 32, 34, 36, 38 which when the housing is located on the body are coplanar with the terminals 16 and 18 and can be secured to the track of the printed circuit board.

Referring now to Figure 2 there is shown the assembled connector of Figure 1 shown generally as 40. A cooperating connector 42 is shown mated with the connector 40. The construction and mating of the two connectors is more easily seen from the drawings of Figures 2 and 3 which shown cross sectional views through the mated assembly. In Figures 3 and 4 it can be seen that the second connector 42 comprises a moulded dielectric body 44 having an elongate recess 46 which is designed to receive the prepared end of a coaxial cable lying in the direction of the arrow Z. The body 44 has a frusto-conical projection 48 and an aperture

connector is mounted on a printed circuit board in the telephone and extends through the back of the housing. The contact 16 is coupled with the integral aerial of the mobile telephone whilst the contact 18 is connected to the transmitter receiver circuitry. The coaxial cable terminated in the connector 42 is coupled with a substitute aerial for example the aerial of a vehicle. Upon mating of the connector 42 with the connector 40 the switch contacts are opened thereby disconnecting the integral aerial from the transmit/receive circuitry and the external aerial is connected to the transmit receive circuitry in its place.

A mobile telephone equipment in accordance with the invention is illustrated in Figure 6 where a mobile telephone 68 is provided with a connector 40 and a cradle 70 for mounting in a vehicle is provided with a connector 42 suitably disposed in the cradle such that the mobile telephone can be located in the cradle with the connectors 40 and 42 in mated disposition thereby providing switchover to connect to the aerial of a vehicle.

Referring now to Figure 7, instead of providing for termination of a coaxial cable in the connector 42 terminals 72 and 74 similar to terminals 16, 18 and 32 to 38 may be provided and bent to form coplanar terminals for connection to the tracks of another printed circuit board so that the two connectors can be employed to make coaxial connection between two printed circuit boards.

Although the embodiments described employ a switch contact 12 which is actuated upon mating by a suitable connector the invention also includes a non switching type connector which may have applications where for example it is required to couple an electrical signal into and out of an electrical equipment via a coaxial cable or to make an electrical communication between two board using a configuration similar to that illustrated in Figure 7.

CLAIMS:

1. A coaxial connector having a housing and a contact in the housing for electrical connection to a contact of a mateable connector, which contact is resiliently deflectable in the mating direction upon mating with a suitable connector.

2. A connector as claimed in claim 1, wherein the housing is metallic, forming a screen for the contact, and an aperture in the housing permits access between the contact and the contact of a mating connector.

3. A connector as claimed in claim 2, wherein the metal housing surrounding the aperture is shaped for cooperative engagement with a complementarily shaped housing of a mating connector.

4. A connector as claimed in claim 3, wherein the metal housing surrounding the aperture is recessed for receipt of a complementarily shaped projection of a mating connector.

5. A connector as claimed in claim 4, wherein the recess is of truncated conical cross section.

6. A connector as claimed in any one of claims 2 to 5, adapted for mounting on a printed circuit board by the provision of a terminal communicating with both the housing and a terminal communicating with the contact, which terminals extend at one side of the housing.

7. A connector as claimed in claim 6, wherein the terminals extend in a radial direction relative to the mating direction and are substantially coplanar.

8. A connector as claimed in any one of the preceding claims, wherein the contact is deflectable to actuate a

15. A combination as claimed in claim 14, wherein the projecting element has an end within the housing which extends laterally.

16. A combination as claimed in claim 14 or 15,
 5 wherein the second connector comprises a cable support body mountable in the housing having an elongate recess extending transversely of the mating direction for receiving the prepared end of a coaxial cable, and a closure retentively locatable on the housing, which recess has projecting
 10 insulation displacement connectors extending into the recess and adapted to connect to screen and centre conductor of the prepared cable which are urged into engagement therewith when the closure is fitted on the housing.

17. A mobile telephone having a connector as claimed
 15 in any one of claims 8 to 12, wherein the switch is provided in the path between the integral aerial of the telephone and the transmitter/receiver circuitry and is effective to disconnect the integral aerial as a result of mating with a suitable connector coupled to a substitute aerial.

18. A mobile telephone equipment having a connector
 20 combination as claimed in any one of claims 13 to 16, wherein the first connector is provided on a mobile telephone and a second connector is provided on a vehicle coupled to a vehicle aerial the coupling of the connectors
 25 being effective to disconnect the integral aerial and connect the external aerial.

19. A mobile telephone equipment as claimed in claim
 30 18, wherein the second connector is provided in a carrying cradle for the telephone such that first and second connectors are caused to interconnect by insertion of the telephone into the cradle.



Application No: GB 9522901.9
Claims searched: 1 to 22

Examiner: F J Fee
Date of search: 25 January 1996

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): H2E [ECAAX, ECBB]

Int Cl (Ed.6): H01R

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
Y	GB 2282715 A [TA]	5
Y	GB 2266627 A [PILKINGTON] figure 4	6, 7
X	GB 0794141 [SCAMMELL]	1 to 5, 13
X	GB 0452191 [BRITISH THOMPSON-HOUSTON]	1 to 4, 13
X	GB 13501/46 [ROESCH] publication laid open for inspection on 3 May 1946	1 to 4, 8, 11, 13, 14
X	EP 0563996 A2 [WHITAKER]	1, 8, 9, 11, 13, 14, 15
Y	EP 0393670 A2 [AMP]	1 to 4, 8, 9, 10, 13, 14, 15
X	WO 81/01082 A1 [NEUENSCHWANDER]	1, 8, 11, 13, 14
Y	US 5322453 [RESNICK]	16
Y	US 5190474 [GINET] figures 3, 5	1, 2, 3, 6, 7, 13, 14, 15

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